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10/550,005	09/23/2005	Takahiko Kondo	01197.0257	5730

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EXAMINER	
CHANG, VICTOR S	

ART UNIT	PAPER NUMBER
1794	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/550,005	KONDO ET AL.	
	Examiner	Art Unit	
	VICTOR S. CHANG	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 September 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,5,8 and 10-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,5,8 and 10-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Introduction

1. Applicants' declaration, amendments and remarks filed on 9/12/2008 have been entered. Claim 1 has been amended. Claims 2, 3, 6, 7 and 9 have been cancelled. Claims 1, 4, 5, 8, 10-24 are active.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. In response to the amendments, the grounds of rejections have been rewritten as set forth below.

Rejections Based on Prior Art

4. Claims 1, 4, 5, 8, 10-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takita et al. [US 6245272], and evidenced by Concise Encyclopedia of Polymer Science and Engineering, pp. 354.

Takita's invention relates to a microporous polyolefin membrane for use as a battery separator for lithium battery [abstract; col. 2, ll. 48-60; col. 3, ll. 1-27 and 60]. The microporous polyolefin membrane formed of a blend B which comprises an ultra-high-molecular-weight polyolefin B-1 having a weight-average molecular weight of $1.5x10^6$ to $15 x10^6$ and a polyolefin B-2 having a weight-average molecular weight of $1x10^4$ to $1x10^6$. Preferably, the blend B contains 15 to 40 w% of B-1 to provide sufficient strength. Useful polyolefins include crystalline homopolymers or copolymers of ethylene, propylene, or blends thereof. Examples of

the polyolefins include high density polyethylene (HDPE), etc. The membrane is formed by a melt extrusion process. Incorporation of propylene ethylene copolymer improves melt-down (fusing) temperature and the characteristics of the membrane for battery separators. As a safety feature, a polymer capable of imparting a shut-down function at low temperature is included for lithium battery separators [col. 3, ll. 58-61]. Example 1 shows a polyethylene mixture comprising 82 wt% HDPE for forming a microporous membrane.

For claims 1, 4 and 13, Takita is silent about: 1) the α-olefin co-monomer content of a HDPE copolymer and its melt index (MI), 2) the viscosity average molecular weight (Mv) of a HDPE, 3) the Mv and the total α-olefin co-monomer content of the blend, and 4) the ranges of film rupture temperature and fusing rupture temperature. However, regarding 1), since it is well known that a HDPE is a polymer of ethylene copolymerized with propylene (α-olefin) for a controlled density and properties, as evidenced by the reference Concise Encyclopedia of Polymer Science and Engineering, selecting a HDPE having a workable propylene (α-olefin) content as Takita's B-2 component is deemed to be an obvious routine optimization to one of ordinary skill in the art, motivated by the desire to obtain a workable density and properties, including MI, for forming a blend having required properties dictated by the same end use as the claimed invention. Regarding 2), since the Takita teaches a blend of HDPE over a range of molecular weights, which inherently infers a range of viscosity average molecular weights Mv, selecting a HDPE with a workable range of Mv is deemed to be either anticipated by Takita, or an obvious routine optimization to one of ordinary skill in the art of battery separator, dictated by the same end use. It should be noted that applicants have chosen to claim the molecular weight in terms of viscosity-average molecular weight Mv, instead of the weight-average molecular

weight disclosed by Takita. However, merely choosing to describe their invention in this manner does not render patentable the claimed battery separator which, for the reasons given above, would have been obvious over Takita. *In re Skoner*, 517 F.2d 947,950, 186 USPQ 80, 82 (CCPA 1975). Regarding 3), since Takita teaches a blend comprising HDPE, and discloses the same subject matter for the same end use (a HDPE blend for making a microporous battery separator), a workable Mv and total α-olefin co-monomer content in the blend are also deemed to be an obvious routine optimization to one of ordinary skill in the art, motivated by the desire to obtain the beneficial properties such as melt processibility of a HDPE blend. Regarding 4), since Takita teaches the same subject matter for the same use (microporous battery separator made of a polyethylene blend for lithium battery), workable ranges of film rupture temperature and fusing rupture temperature of the separator for lithium battery are deemed to be obvious routine optimizations to one of ordinary skill in the art of battery separator, motivated by the desire to obtain required safety features dictated by the same end use as the claimed invention.

For claim 5, since Takita teaches a HDPE over a broad range of molecular weights, which inherently corresponds to a broad range of Mv, a blend of multiple Mv is also deemed to be either anticipated, or obviously provided by practicing the invention of prior art, because it is *prima facie* obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.

For claim 8, since Takita teaches the same subject matter for the same use (microporous battery separator made of a polyethylene blend), a workable shrinkage force of the battery separator is deemed to be an obvious routine optimization to one of ordinary skill in the art of

battery separator, motivated by the desire to obtain required properties dictated by the same end use as the claimed invention. *In re Aller*, 105 USPQ 233.

For claim 10, Takita teaches that the final membrane has a thickness of 5 to 250 μm [col. 6, line 20].

For claim 11, Takita teaches that the membrane has a porosity of 45 to 95% [col. 4, line 3].

For claim 12, Takita teaches that the membrane has an air permeability of 50 to 400 sec/100 cc [col. 4, line 55].

For claims 14, Takita teaches that blend B contains 15 to 40 w% of B-1 to provide sufficient strength, and B-1 has a weight-average molecular weight of $1.5x10^6$ to $15 x10^6$. Further, a low-density polyethylene is incorporated to impart a shut-down function for the battery separator. The low-density polyethylene (LDPE) useful for the present invention includes ethylene/α-olefin copolymer, etc. [col. 3, lines 13-20]. A workable amount of LDPE is deemed to be an obvious routine optimization to one of ordinary skill in the art of a lithium battery separator, motivated by the desire to obtain a required safety feature for the end use.

For claims 15-24, absence of any unexpected end use properties, for the same reasons set forth above, the various battery separator properties are deemed to be obviously provided by practicing the invention of prior art for the same end use.

Response to Argument

5. Since the rejections under 35 USC 102(b) over Takita have been withdrawn, Applicants' arguments directed to 102(b) at pages 6-9 are moot.

Applicants argue at pages 10-11

> "Takita is silent about the recited a-olefin comonomer content of a HDPE copolymer, the melt index, the viscosity average molecular weight, the molecular weight of the blend, the total a-olefin content and percentage of copolymer. In addition, Takita provides no insight as to why the a-olefin comonomer content of a HDPE copolymer or the percentage of the HDPE copolymer would be relevant to improving the overall properties of microporous films."

However, since it is well known that a HDPE is a polymer of ethylene copolymerized with propylene (α-olefin) for a controlled density and properties, as evidenced by the reference Concise Encyclopedia of Polymer Science and Engineering, selecting a HDPE having a workable propylene (α-olefin) content as Takita's B-2 component is deemed to be an obvious routine optimization to one of ordinary skill in the art, motivated by the desire to obtain a workable density and properties, including MI, for forming a blend having required properties dictated by the same end use as the claimed invention.

Applicants argue at page 11

> "the Encyclopedia provides no insight or guidance as to how or why a specific α-olefin range and a specific percentage of an HDPE copolymer in a blend would be useful to obtain certain overall properties, much less the properties as claimed. Moreover, the Encyclopedia provides no teaching or suggestion that would allow the skilled artisan to believe that even if, arguendo, one of skill in the art did incorporate an HDPE copolymer in the recited range and containing an amount of a-olefins into a microporous film, that the properties as claimed would have been predictable."

However, since the Encyclopedia teaches that a HDPE is a polymer of ethylene copolymerized with propylene (α-olefin) for a controlled density and properties, the comonomer is clearly taught as result effective in modifying HDPE properties. It is unseen that one of ordinary skill in the art would fail to instantly envisage the advantages of the common and well knowledge of incorporating the α-olefin comonomer for controlled HDPE properties for the same end use as the claimed invention.

Applicants argue at page 12

> "Applicants respectfully direct the Examiner's attention to the attached Declaration Under 37 C.F.R. §1.132, of Masahiro Ohashi, in which Applicants' provide data establishing the criticality of the claimed HDPE copolymer range of about 10 to about 90%. This data clearly establishes the criticality of the claimed blend for obtaining good balance of both fusing and film rupture temperatures."

However, Takita at least shows in Example 1 a microporous membrane formed from a polyethylene blend comprising 82 wt% HDPE, and reads on the instant invention as claimed.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to VICTOR S. CHANG whose telephone number is (571)272-1474. The examiner can normally be reached on 7:00 am - 5:00 pm, Tuesday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rena Dye can be reached on 571-272-3186. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Victor S Chang/
Primary Examiner, Art Unit 1794